

UNCLASSIFIED

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2005	
APPROPRIATION/BUDGET ACTIVITY RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4					R-1 ITEM NOMENCLATURE 0603563N/Ship Concept Advanced Design			
COST (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Total PE Cost	19.006	16.166	11.899	22.215	31.584	31.590	31.624	31.603
2196/Design Tools, Plans & Concepts	6.049	3.687	11.899	22.215	31.584	31.590	31.624	31.603
9041/Small Combatant Craft	8.707	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9042/Sealion Tech Demo	0.967	8.319	0.000	0.000	0.000	0.000	0.000	0.000
9044/Document Automation of ICAS & Other Navy	1.645	2.476	0.000	0.000	0.000	0.000	0.000	0.000
9193/Total Fleet Support	1.638	1.684	0.000	0.000	0.000	0.000	0.000	0.000
<p>A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:</p> <p>Explore alternative surface ship force structures, advanced surface ship & unmanned surface vehicles concepts, and the potential technologies for these force structures and advanced concepts in support of pre-acquisition mission needs analysis, mission area analysis, SCN and R&D planning. The objective is a more affordable, mission capable surface ship force including ships with reduced manning, increased producibility, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for surface ship force structure alternative studies, ship & unmanned vehicle concept studies, and the actual conduct of surface ship force structure alternative studies and advanced design concept studies for the ships that may become part of the SCN plan.</p> <p>(U) Project 2196 - This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria are also funded in this project.</p> <p><u>Congressional Adds:</u></p> <p>(U) Project 9041: This project funds only acquisition, test and evaluation of a high speed variable freeboard planning craft and related special warfare high speed support craft and equipment.</p> <p>(U) Project 9042: This project funds Situation Awareness Module, related to the Sealion Craft (project S9041).</p> <p>(U) Project 9044: This project funds Documentation Automation of Integrated Condition Assessment System (ICAS) Maintenance and other Navy procedures in XML format.</p> <p>(U) Project 9193: This project funds development and analysis of fleet support technologies.</p>								

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Exhibit R-2, RDTEN Budget Item Justification
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APPROPRIATION/BUDGET ACTIVITY RDT&E, N /BA-4	PROGRAM ELEMENT NUMBER AND NAME 0603563N/Ship Concept Advanced Design				PROJECT NUMBER AND NAME 2196/Design Tools, Plans, and Concepts			
COST (\$ in Millions)	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011
Project Cost	6.049	3.687	11.899	22.215	31.584	31.590	31.624	31.603
RDT&E Articles Qty								
<p>A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: A. (U) Mission Description and Budget Item Justification: This project develops and explores alternative surface ship force structures, the advanced surface ship & unmanned surface vehicles concepts, and the potential technologies for these force structures and the advanced concepts in support pre-acquisition mission needs analysis, mission area analysis, SCN and R&D planning. The objective is a more affordable, mission capable surface ship force including ships with reduced manning, increased producibility, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for surface ship force structure alternative studies, ship & unmanned vehicle concept studies, and the actual conduct of surface ship force structure alternative studies and advanced design concept studies for the ships that may become part of the SCN plan.</p> <p>(U) This project provides the foundation for an affordable and mission capable surface ship force. It also supports the next step in the development of a transformed naval force by accomplishing the pre-milestone A (especially pre-concept decision) efforts for all potential surface ships and craft. These efforts are the required first step in the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design, construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts and technologies may never even be considered and our greatest potential ship design advances never realized. Designs and technologies must meet the threat. This project supports this requirement.</p> <p>(U) This project funds concept development engineering, mission effectiveness analysis, and other analyses for formulation of future surface ship force structure along with development of the tools to accomplish these efforts. Advanced ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship concept design and engineering tools, methods, and criteria are also funded in this project.</p> <p>(U) This project accomplishes the following: (1) Develops alternative surface ship force structure concepts including the ships and unmanned vehicles; (2) Evaluates the mission capability effectiveness and costs for these alternative surface fleet architectures; (3) Performs fleet warfighting / mission effectiveness assessment studies; (4) Identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs; (5) Investigates new affordable ship concepts and evaluates technologies necessary to support these concepts; (6) Provides design methods and automated design tools to develop and evaluate ship concepts; and (7) Supports development of Initial Capabilities Documents (ICD) and analogous early requirements documents for future ships. These efforts are done to support mission analysis, mission needs development and technology assessment in support of future fleet concepts and potential ship acquisition programs. These efforts are foundational to the Navy's formulation of the future fleet.</p> <p>(U) Efforts under Project 2196 transition directly to early stage ship design in PE 0603564N, Ship Preliminary Design and Feasibility Studies and similar Program Executive Office (PEO) ship design programs. While these efforts support concept exploration and mission needs assessment for potential future ship acquisition programs, they are not direct efforts for specific, authorized shipbuilding programs. This project is the only R&D effort (Government or commercial) that supports and maintains this country's naval ship design and engineering capabilities in the area of very early stage (Concept Design) design tools, criteria, and methods.</p>								

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Exhibit R-2, RDTE Budget Item Justification
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APPROPRIATION/BUDGET ACTIVITY RDT&E, N /BA-4	PROGRAM ELEMENT NUMBER AND NAME 0603563N/Ship Concept Advanced Design	PROJECT NUMBER AND NAME 2196/Design Tools, Plans, and Concepts		
B. Accomplishments/Planned Program				
	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	1.820	1.000	0.700	0.750
RDT&E Articles Quantity				
<div style="border: 1px solid black; padding: 5px;"> (U) Ship Concepts and Mission Need Analysis: Develop ship concepts and perform mission area analysis (MAA) for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone A ship concept studies for potential ship concepts/configurations in support of SCN planning. Assess the future ship concepts as part of potential future fleet architecture concepts. </div>				
	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.734	0.542	0.250	0.450
RDT&E Articles Quantity				
<div style="border: 1px solid black; padding: 5px;"> (U) Total Ship Technology Assessment: Analyze the benefits and impacts of new ship and hull, mechanical & electrical (HM&E) concepts and technologies. Identify, characterize and assess new and emergent technologies. Develop methodologies for assessment of benefits and impacts of technologies in total ship concepts. Support development of total ship and HM&E technology roadmaps. </div>				
	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.965	0.945	0.699	0.720
RDT&E Articles Quantity				
<div style="border: 1px solid black; padding: 5px;"> (U) Ship Concept Design and Engineering Tools, Methods, and Criteria: Improve capability for rapid and accurate ship performance/cost/risk assessments and tradeoff studies. Improve the US Navy's Advanced Surface Ship Evaluation Tool (ASSET) surface ship synthesis/assessment models in the following areas: improve performance assessment capabilities, update and enhance capabilities to handle new ship configurations, hull form alternatives, signature reduction features, characterize advanced machinery technologies, address optimal required shipboard manning, reduced total ownership cost, and increased capabilities to determine ship size impacts of new technologies including warfare systems. Improve interoperability of Navy and shipbuilder design systems. </div>				

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	FY 04	FY 05	FY 06	FY 07															
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	FY 04	FY 05	FY 06	FY 07															
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	FY 04	FY 05	FY 06	FY 07															
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RDT&E Articles Quantity	N/A	N/A	N/A	N/A															
<div style="border: 1px solid black; padding: 5px;"> <p>(U) Future Ship and Force Concept Design: Center for Innovation in Ship Design - Revitalize design, engineering education and research to ensure engineering capability to develop and design innovative, affordable, mission capable naval ships which utilize the latest technologies.</p> </div>																			
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	FY 04	FY 05	FY 06	FY 07															
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.470	0.810															
RDT&E Articles Quantity																			
<div style="border: 1px solid black; padding: 5px;"> <p>(U) Future Submarine and Submersible Concept Design: Hydrodynamic/Hydroacoustic Technical Center - Provides Government activities, shipbuilders, academia and contractors the following: high performance computing systems; commercial and research software libraries; classified and unclassified connectivity; high end data visualization; and collaboration tools/Centralized data repository.</p> </div>																			
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Accomplishments/Effort/Subtotal Cost	0.000	0.000	1.210	2.460															
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<div style="border: 1px solid black; padding: 5px;"> <p>(U) Future Ship and Force Concept Design: High Speed Ships and Craft - Technology, Design Criteria and Process Development - Engineering development for transformational capabilities to include design processes, tools design standards and criteria for high speed ships and craft.</p> </div>																			

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B. Accomplishments/Planned Program (Cont.)

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.480	1.230
RDT&E Articles Quantity	N/A	N/A	N/A	N/A

(U) Future Ship and Force Concept Design:
Next Generation USV - Development, demonstration and deployment of Unmanned Surface Vehicle (USVs) and possible air droppable USVs. Achievement of full war fighting utility and full mission package capability will require innovations in vehicle design, sensors, autonomous behavior and modular payloads. Focus on utility in surface warfare especially new ship classes with improved deployable vehicle capabilities such as DD(X), LCS and CG(X).

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.820	1.840
RDT&E Articles Quantity				

(U) Ship Design and Certification Tools:
Ship Certification Tools - Evaluation tools to certify the safety and mission capability of Navy ships. Top-Level metrics & monitoring of certification capability. Technical coordination of tool development efforts sponsored with focus on surface warfare and submarine warfare needs.

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.790	1.370
RDT&E Articles Quantity				

(U) Future Ship and Force Concept Design:
Ship Concept Advanced Development - Directly supports the Navy's ability to understand and quantify mission requirements impacts on surface warfare assets; Pre-Milestone A ship and craft design and analysis to determine ROM cost and feasibility of new technologies being incorporated into ship designs; performs risk mitigation engineering for ongoing acquisition programs such as LCS (especially future flights) and CGX.

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B. Accomplishments/Planned Program (Cont.)

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	0.540	1.800
RDT&E Articles Quantity	N/A	N/A	N/A	N/A

(U) Ship Design and Certification Tools:
Engineering and Technical Data Exchange (Formally: Ship Development Systems Interoperability) - Develop and implement a framework of standardized interfaces for ship development and engineering systems: built upon ISO 10303 STEP content standards and XML format specifications, CAD to CAD and CAD to CAE/Vis/Sim interfaces; align with Technical Authority Warrants; and eliminate need for custom interface to each program's IDE for design review and certification (recurring NRE). Focus on surface warfare, expeditionary warfare and submarine warfare issues initially.

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	1.690	3.280
RDT&E Articles Quantity				

(U) Future Submarine and Submersible Concept Design:
Submarine Design - Transform the submarine fleet with dramatic increases in mission effectiveness. Innovate the 'Navy after Next' concepts. Develop knowledge to invest smartly in technology. Develop ship concept studies and evaluate technologies to define the Next Generation Submarine. Common SSN-SSBN Hull and Payload Modularity.

	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	1.690	2.870
RDT&E Articles Quantity				

(U) Interoperability Engineering:
Imbedded Interoperability Engineering - Interoperability engineering tests must occur prior to certification to prevent critical failures in systems deliveries. Evaluate Open Architecture and the Single Integrated Air Picture Track Manager. Certify Strike Force Interoperability.

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	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost	0.000	0.000	1.590	2.700
RDT&E Articles Quantity	N/A	N/A	N/A	N/A
(U) Interoperability Engineering: Mission Capability Systems Engineering - Development of force level systems engineering requirements. The application of system level requirements necessary to support spiral developments that build to a "system of systems" capability.				
	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost				
RDT&E Articles Quantity				
	FY 04	FY 05	FY 06	FY 07
Accomplishments/Effort/Subtotal Cost				
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C. PROGRAM CHANGE SUMMARY:

	FY 2004	FY 2005	FY 2006	FY 2007
Funding:				
FY 2005 President's Budget:	7.594	3.723	1.721	21.646
FY 2006/2007 President's Budget:	19.006	16.166	11.899	22.215
Total Adjustments	11.412	12.443	10.178	0.569
Summary of Adjustments				
SBIR	-0.357			
Execution Realignment	-1.451			
Congressional Adds	13.400	12.600		
Programmatic Adjustment: NAVSEA Technical Authority			10.000	
Miscellaneous Adjustments	-0.180	-0.157	0.178	0.569
Subtotal	11.412	12.443	10.178	0.569

Schedule: Ten new efforts (grouped in 4 specialty areas) were added to this project. The planned schedule is as follows:

Future Ship and Force Concept Design (4 new projects) will commence in FY06 with:

- Ship Concept Advanced Design adds robust early examination of LCS future flight and CG(X) concepts in support of AOA preparations.
- Next Generation USV commences an advanced development project building upon Advanced Maritime Navigation, Airdropable SBIR and other efforts, leading to future year prototyping. FY06 efforts include market survey, data collection, tool development and planning of a multiyear effort.
- High Speed Ships and Craft - Technology, Design Criteria and Process Development will commence in FY06, utilizing results of CISD FY06 efforts and being jointly managed by the CISD program manager serving as High Speed Ships & Craft APM within S&FAC/SCAD.

Two new efforts each for ship certification tools, for submarine concept, for interoperability engineering that will all commence in FY06.

Technical: Hydro Tech Center, though led by submarine community, will also address surface hydro/acoustic issues. Tools, though led by surface community, will also address submarine tools issues.

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D. OTHER PROGRAM FUNDING SUMMARY:

Line Item No. & Name	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	To Complete	Total Cost
(U) Related RDT&E										
(U) PE 0603512N (Carrier Systems Development)	7.742	7.874	10.434	9.908	7.930	7.629	7.149	4.122		
(U) PE 0603513N (Shipboard Systems Component Development)	3.613	1.899	2.182	1.647	1.924	1.949	1.970	1.987		
(U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)	0.000	0.000	10.874	13.419	7.406	1.600	0.729	1.022		
(U) PE 0604300N (SC21 Total Ship Systems Engineering)	155.984	206.800	204.937	140.698	79.660	47.152	46.598	55.927		
(U) PE 0604567N (Ship Contract Design/Live Fire T&E)	11.306	13.091	5.525	8.580	8.249	5.811	3.975	8.521		

E. ACQUISITION STRATEGY:

This is a non acquisition program that develops, evaluates, and validates early stages of total ship concepts and technologies in support of SCN planning and potential future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for those concept designs and assessments.

F. MAJOR PERFORMERS:

Field Activities & Locations - Work Performed:

- NSWC Carderock, Bethesda, MD - Future ship open architectures, advanced ship concepts, ship & ship system technology assessments, design & engineering tool upgrades
- NSWC Dahlgren, Dahlgren, VA - Future force architectures, mission effectiveness analyses, analytical tool development
- SPAWAR, San Diego, CA - C4ISR systems concept development & integration

Contractors & Locations - Work Performed

- TBD - Systems engineering analyses, trade studies, ship concept design, cost impact analysis
- TBD - Software, tools development

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CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 1)										DATE: February 2005				
APPROPRIATION/BUDGET ACTIVITY			PROGRAM ELEMENT			PROJECT NUMBER AND NAME								
RDT&E, N /BA-4			0603563N/Ship Concept Advanced Design			2196/Design Tools, Plans, and Concepts								
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY's Cost	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development													0.000	
Systems Engineering	various	Other Various Contractors	56.032	1.414	various	1.171	various	2.778	various	4.600	various	Continuing	Continuing	
Engineering Development	WX & RX	NAVSEA, Dahlgren Div,		2.905	various	0.901	various	4.400	various	8.649	various	Continuing	Continuing	
		Dahlgren, VA												
Demonstration & Evaluation	WX & RX	NAVSEA, Carderock Div,	32.296	1.550	various	0.983	various	4.551	various	8.796	various	Continuing	Continuing	
		West Bethesda, MD												
	WX & RX	SPAWAR						0.150	various	0.150	various	Continuing	Continuing	
Licenses													0.000	
Tooling	WX\RXPD	SPAWAR	9.629	0.150	various	0.612	various					0.000	10.391	
GFE													0.000	
Award Fees													0.000	
Subtotal Product Development			97.957	6.019		3.667		11.879		22.195		0.000	141.717	
Remarks:														
Development Support													0.000	
Software Development													0.000	
Training Development													0.000	
Integrated Logistics Support													0.000	
Configuration Management													0.000	
Technical Data													0.000	
GFE													0.000	
Award Fees													0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000		0.000	0.000	
Remarks:														

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Exhibit R-2, RD TEN Budget Item Justification
(Exhibit R-2, page 11 of 14)

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CLASSIFICATION:

Exhibit R-3 Cost Analysis (page 2)										DATE: February 2005				
APPROPRIATION/BUDGET ACTIVITY RD&E, N /BA-4			PROGRAM ELEMENT 0603563N/Ship Concept Advanced Design				PROJECT NUMBER AND NAME 2196/Design Tools, Plans, and Concepts							
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 04 Cost	FY 04 Award Date	FY 05 Cost	FY 05 Award Date	FY 06 Cost	FY 06 Award Date	FY 07 Cost	FY 07 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation													0.000	
Operational Test & Evaluation													0.000	
Live Fire Test & Evaluation													0.000	
Test Assets													0.000	
Tooling													0.000	
GFE													0.000	
Award Fees													0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000		0.000	0.000	
Remarks:														
Contractor Engineering Support													0.000	
Government Engineering Support													0.000	
Program Management Support													0.000	
Travel				0.030		0.020		0.020		0.020		Continuing	Continuing	
Labor (Research Personnel)													0.000	
SBIR Assessment													0.000	
Subtotal Management			0.000	0.030		0.020		0.020		0.020		0.000	0.090	
Remarks:														
Total Cost			97.957	6.049		3.687		11.899		22.215		0.000	141.807	
Remarks:														

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CLASSIFICATION:

EXHIBIT R4, Schedule Profile																								DATE:				February 2005				
APPROPRIATION/BUDGET ACTIVITY									PROGRAM ELEMENT NUMBER AND NAME												PROJECT NUMBER AND NAME											
RDT&E, N /BA-4									0603563N/Ship Concept Advanced Design												2196/Design Tools, Plans, and Concepts											
Fiscal Year	2004				2005				2006				2007				2008				2009				2010				2011			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering Milestones																																
Pre-MS A Ship Concept Studies																																
Ship Synthesis Modeling Tool																																
Extension to Small & Alt Hull Modular Framwork & Interface Interface to Performance																																
Commencement of Early Stage Multi Discipline Eval Model																																
Initial Trial & Dev of Multi-disciplinary Evaluation Model																																
Capability to Assess Alt & Adv Hull Forms																																
Commence Force Architecture Methodology																																
Force Architecture Including Futures & Force Structure Alt																																
Initial Open Systems Architecture & other Technology Assessments																																
Assessment of Technology Benefits																																
Technology Management & Cost Assessment Methods																																
New POM06 projects																																

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* Not required for Budget Activities 1, 2, 3, and 6

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Exhibit R-2, RD TEN Budget Item Justification
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